



UNIVERSITI PUTRA MALAYSIA

**COMPARATIVE ANALYSIS OF FORECASTING
PERFORMANCE : CRUDE PALM OIL FUTURES (CPO) PRICES
VS EXPERT OPINIONS**

ABDULLAHI FARAH AHMED

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By

ABDULLAHI FARAH AHMED

**Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of
Science in the Faculty of Agriculture
Universiti Putra Malaysia**

July 2001



***DEDICATED
TO
MY BELOVED PARENTS,
FARAH AND AWRALA***

Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Master Science

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July 2001

Chairperson: Ismail Abd Latif

Faculty: Agriculture

The main economic functions of the futures market are to provide price discovery and risk management facilities. It is well known that the futures market can function well only when the futures prices provide accurate price forecast to subsequent cash prices. The greater the degree of price forecast accuracy, the greater the effectiveness of the futures market in terms of performing its economic functions. If the market is not efficient, effective transmission of information from one market to another will be impaired, thus the value of the futures market in price discovery and hedging.

The creation of the crude palm oil (CPO) futures market in Malaysia was to fulfil the need for an efficient pricing and hedging mechanism for Malaysia's palm oil. Therefore, the extent to which CPO futures market has served as an efficient center of price discovery and risk management, has been the focus of considerable research. In general, debate has centered around the extent of which futures market provide price leadership to cash market and the ability of futures market to predict subsequent spot

debate has centered around the extent of which futures market provide price leadership to cash market and the ability of futures market to predict subsequent spot price in accurate way. Empirical evidence has shown that CPO futures prices performed relatively better compared to other forecasting models. However, no comparison is made in forecast accuracy of CPO futures with expert opinion. This approach is unique in the sense that it examines the relative efficiency of *ex ante* forecasts rather than *ex post*.

The objectives of this study are: firstly, to evaluate the forecast accuracy of the CPO futures market relative to expert prediction. Secondly, to test the relationship between the futures, forward and cash prices, to examine whether these price series have the same properties and relationship in the long-run.

AGS and the Johansen's cointegrations techniques were used to analyze the forecast accuracy and long-run relationship over, 1st, 2nd, 3rd and 4th month spreads of futures and forward prices. The analyzed sample data consists of the daily end-of-month trading prices of the futures, cash, and forward prices for the period from January 1989 to December 1999.

The findings of this study suggested that the forward forecast accuracy price was superior to the futures. It implies that the forward prices which represent expert prediction of cash price, contain more information for price discovery than CPO futures prices in the one month and two months horizons. This finding indicated that the CPO of futures market is relatively less efficient. Hence, the use of futures prices for short-term price forecasting may be more biased than relying on expert forecasts.

Furthermore, it was found that the futures and cash prices ~~were cointegrated~~ for up to two months spread. Similarly forward and cash prices were also cointegrated for up to two months into the future. This suggests that futures and forward prices can be used to predict subsequent spot price up to two month in advance. It was also detected that an error correction mechanism exists which brought cash and futures price into equilibrium whenever they diverged. The evidence also points to the dependence of cash market on futures markets for price leadership.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**KETEPATAN RAMALAN HARGA: HARGA NIAGA HADAPAN MINYAK
SAWIT MENTAH (MSM) VS RAMALAN PAKAR**

Oleh

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Fungsi ekonomi utama pasaran niaga hadapan adalah untuk menyediakan kemudahan penemuan harga dan pengurusan risiko. Pasaran niaga hadapan akan dapat berfungsi dengan baik apabila harga niaga hadapan memberi ramalan yang tepat keatas harga tunai yang berikutnya. Lebih tinggi ketepatan harga niaga hadapan meramal, maka lebih tinggi keberkesanan pasaran ini melaksanakan fungsinya. Pasaran yang tidak cekap akan menjejaskan aliran licin maklumat dari satu pasaran kepada pasaran yang lian; lantas melemahkan fungsi pasaran niaga hadapan dalam melaksanakan fungsi lindung nilai dan pengurusan risiko.

Pewujudan pasaran niaga hadapan Minyak Sawit Mentah (MSM) bertujuan untuk memenuhi keperluan mekanisme letak harga dan lindung nilai yang cekap untuk industri kelapa sawit Malaysia. Maka isu ini iaitu sejauh mana pasaran ini berfungsi sebagai pusat penemuan harga dan pengurusan telah menjadi fokus kepada beberapa penyelidikan. Secara umum, debat tentang isu ini menjurus kepada sejauhmana pasaran

niaga hadapan berlaku sebagai ketua harga kepada pasaran tunai dan keupayaannya meramal harga tunai yang berikutnya dengan tepat. Bukti empirik menunjukkan bahawa harga niaga hadapan MSM boleh meramal dengan baik berbanding dengan model unjuran. Namun, masih belum ada perbandingan dibuat tentang ketepatan unjuran niaga hadapan dengan ramalan pakar. Perbandingan antara dua kaedah ini adalah unik kerana keduanya membandingkan kecekapan relatif unjuran *ex ante* dan tidak *ex post*.

Objektif kajian ini adalah: pertama; untuk menilai ketepatan ramalan pasaran niaga hadapan MSM berbanding dengan ramalan pakar. Kedua; untuk menguji perkaitan antara harga niaga hadapan, hadapan dan tunai. Ketiga; untuk meneliti sama ada siri-siri ini menampilkan tabii dan perkaitan yang sama dalam jangka masa panjang.

Kajian ini menggunakan ujian AGS yang dipelopori oleh Ashley, Granger dan Schmalensee (AGS) untuk menguji perhubungan jangka masa panjang bagi jeda antara harga niaga hadapan dan hadapan bagi bulan pertama, kedua, tiga dan keempat. Data yang dianalisis adalah data harian bagi harga niaga diujung bulan bagi niaga hadapan, hadapan dan tunai untuk jangka waktu Januari 1989 hingga Disember 1999.

Kajian mendapati bukti yang bererti yang menyokong kepada hujah bahawa ramalan hadapan adalah lebih baik daripada niaga hadapan. Ini menyarankan bahawa harga hadapan yang juga mewakili ramalan pakar keatas harga tunai mengandungi lebih maklumat untuk membantu penemuan harga dibandingkan dengan harga niaga hadapan terutama bagi bulan pertama dan kedua. Penemuan ini mencadangkan bahawa pasaran niaga hadapan MSM adalah tidak secepat dibandingkan dengan harga hadapan. Maka,

penggunaan harga niaga hadapan dalam jangka masa pendek mungkin bias berbanding dengan ramalan pakar. Lagipun, didapati bahawa harga niaga hadapan dan tunai berkointegrasi sehingga jeda dua bulan. Harga hadapan dan tunai juga berkointegrasi sehingga dua bulan ke hadapan. Ini mencadangkan bahawa harga niaga hadapan dan hadapan boleh digunakan untuk meramal harga spot yang berikutnya dua bulan lebih awal. Kajian mendapati bahawa mekanisme pembetulan ralat wujud yang membawa harga niaga hadapan dan tunai kedalam keseimbangan apabila keduanya tidak selari. Penemuan kajian juga menunjukkan kepada pergantungan pasaran tunai kepada niaga hadapan untuk ketua harga.

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I certify that an Examination Committee met on 20th July 2001 to conduct the final examination of Abdullahi Farah Ahmed on his Master of Science thesis entitled “Comparative Analysis of Forecasting Performance: Crude Palm Oil Futures Price vs Expert Opinion” in accordance with Universiti Pertanian Malaysia (High Degree) Act 1980 and Universiti Pertanian Malaysia (High Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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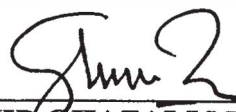
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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledge. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



ABDULLAHI FARAH AHMED

Date: 21 /08/ 2001

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LIST OF ABBREVIATIONS

AGS	=Ashley, Granger and Schmalensee
ARIMA	= Autoregressive Integrated Moving Average
COMMEX	=Commodity and Monetary Exchange
LIFFE	= London International Financial Future Exchange
MARMA	= Multivariate-autoregressive Moving Average
ML	= Maximum-likelihood
MPOB	=Malaysian Palm Oil Board
PORIM	=Palm Oil Research Institute of Malaysia
PORLA	=Palm Oil Registration and Licensing Authority
U	=Theil's Inequality Coefficient
VAR	=Vector Autoregressive
FELDA	=Federal Land Development Authority
FELCRA	=Federal land Consolidation and Rehabilitation Authority
CPO	=Crude Palm Oil
RISDA	=Rubber Industry Smallholders Development Authority

CHAPTER 1

INTRODUCTION

1.1 Malaysian Palm Oil Sector

1.1.1 Introduction

The progressive pursuit of oil palm cultivation had evolved Malaysia from a mere producer of crude palm oil (CPO) into a more diversified producer of new and higher value-added downstream food and non-food products.

In 1998, Malaysia's palm oil accounted for 49.9 per cent of the world production and 67.6 per cent of the world trade in palm oil. Palm oil had emerged as a major player in the international oils and fats market. Export earnings from palm oil and related products increased from RM 2.60 and 6.3 billion in 1980 and 1990, respectively, which increased to 22.64 billion in 1998, making the oil palm industry the second largest export earner in the country after electrical and electronic products. The industry provides employment to about 350,000 workers in the plantations, government land schemes and supporting industries and services (PORLA, 2000).

1.1.2 Production

Production of palm oil from Malaysia has been increasing over the years from 92,000 tonnes in 1960 to 2.6 million tonnes in 1980 and to 10.55 million tonnes in 1999. This was due to the increase in matured area, particularly in Sabah. However,

as Table 1.1 shows the production decreased by 8.3 per cent from 9.06 million tonnes in 1997 to 8.3 million tonnes in 1998. The decline in production was the lower yield of fresh fruit bunches due to stress cycle experienced by the oil palm trees which occurs every three or four years, as happened in 1994. In 1994 there was still a fall in yield production from the previous year but having rested, the palms increased their yields from 1995-1997. This decline in production was also associated with the haze and prolonged dry spell which affected Malaysia in the second half of 1997 due to the El-Nino phenomenon (PORLA, 1999).

Production is still mainly from Peninsular Malaysia with 7.427 million tonnes (70.4 per cent) in 1999 as shown in Table 1.1. The share of total production is declining in Peninsular Malaysia as the share of East Malaysia expanded. Thus, the Peninsula produced only 70.4 per cent of the total production in 1999 compared with 76.4 per cent in 1980. Production of crude palm oil in 1999 increased to 10.55 million tonnes, reflecting an growth of 26.9 per cent or 2.23 million tonnes compared to 8.32 million tonnes in 1998 (PORLA, 2000).

This was mainly attributed to the favorable weather conditions and rainfall distribution as well as constant sunshine throughout the year. These ensured more effective pollination and formation of palm fruits. Consequently, the oil palm fruit yield per hectare increased to 19.26 tonnes compared to 15.98 tonnes recorded in 1998. The increase in matured oil palm areas also contributed to the expansion in crude palm oil production.

Table1.1: Share of production and growth of crude palm oil by state, 1980-1999 (Tonnes)

State/Year	1980		1990			1995			1999		
	Tones	Share %	Tonnes	Share %	Change %	Tonnes	Share %	Change %	Tonnes	Share %	Change %
Johore	737,674	28.7	1,681,428	27.5	127.9	1,847,764	23.7	9.9	2,425,163	23	31.2
Pahang	460,669	17.9	1,264,547	20.7	174.5	1,571,236	20.1	24.3	1,867,106	17.7	18.8
Perak	368,609	14.3	779,352	12.8	111.4	997,161	12.8	27.9	1,220,922	11.6	22.4
Selangor	445,350	17.3	630,122	10.3	41.5	614,707	7.9	-2.4	618,857	5.9	0.7
N.Sembilan	168,198	4.9	337,827	4.7	5.5	393,088	4.1	5.0	452,398	4.3	15.1
Terengganu	107307	3.9	299,540	3.6	4.9	307,331	4.0	3.9	410,047	3.9	33.4
Kelantan	27,034	1.1	125,010	2.0	362.4	163,225	2.1	30.6	215,723	2.0	32.2
Kedah	11,932	0.5	802,62	1.3	572.7	102,473	1.3	27.7	128,701	1.2	25.6
Penang	41,721	1.6	73,088	1.2	75.2	53,657	0.7	-26.6	46,086	0.4	-14.1
Malacca	26,830	1.0	46,801	0.8	74.4	43,938	0.6	-6.1	42,835	0.4	-2.5
P. Malaysia	2,395,324	76.4	5,317,977	72.9	87.1	6,094,580	72	78.0	7,427,838	70.4	21..9
Sabah	156,471	6.1	678,995	11.1	333.9	1,493,623	19.1	120.0	2,664,516	25.2	78.4
Sarawak	22,378	0.9	107,651	1.8	381.1	222,363	2.8	106.6	461,564	4.4	107.6
Sabah/Sarawak	178,849	23.6	786,646	27.1	12.9	1,715,986	31.6	22.0	3,126,080	29.6	82.2.
Malaysia	2,574,173	100.0	6,104,623	100.0	137.1	7,810,566	100.0	27.9	10,553,918	100	35.1

Sources: PORLA, Palm Oil Update, various issues.

The ending stock in 1999 at 1,175,693 tonnes was higher than that of 1998, which was at 824,815 tonnes. With production of palm oil being forecast at 10.8 million tonnes for 2000, it is anticipated that the scenario for palm oil in 2000 would be another favorable one. Thus, approximately 12 million tonnes of palm oil would be available for trade from Malaysia in 2000 against 11.4 million tonnes in the previous year (PORLA, 2000).

The world production of palm oil had witnessed a rapid growth compared to other oils and fats during the 1980-1998. Thus the palm oil's share of the world oils and fats production increased to 18.6 per cent in 1999 from 13.3 per cent in 1990, while that of soyabean oil rose to 22.8 per cent from 19.4 per cent during the same period as shown in table 1.2. In 1998, Malaysia contributed 52.9 per cent of the world palm oil production, while Indonesia 30 per cent (Table 1.3).

The world oils and fats production reached 108.8 million tonnes in 1999, an increase of 14.9 per cent or 14.12 million tonnes from 1995. A significant share of the increase comprised of vegetable oils, which grew at 14.0 per cent per annum as against 6.9 per cent per annum for animal oils and fats. Soybean oil remained the largest oils and fats produced at 24.7 million tonnes, followed by palm oil at 20.3 million tonnes, rapeseed oil at 12.9 million tonnes, sunflower oil at 9.2 million tonnes and tallow at 7.5 million tonnes (Table 1..2).

Table1. 2: World production of 17 oils and fat, 1980-1999 ('000 tones)

Oils & Fats	1980		1990			1995			1999		
	Tonnes	Share %	Tonnes	Share %	Change %	Tonnes	Share %	Change %	Tonnes	Share %	Change %
Soyabean Oil	13,382	22.4	16,097	19.4	20.3	20,307	21.5	26.2	24,755	22.8	21.9
Palm Oil	4,543	7.6	11,027	13.3	142.7	15,118	16.0	37.1	20,277	18.6	34.1
Rapeseed Oil	3,474	5.8	8,160	9.8	134.9	10,976	11.6	34.5	12,936	11.9	17.9
Sunflowerseed Oil	5,024	8.4	7,869	9.5	56.6	8,686	9.2	10.4	9,237	8.5	6.3
Groundnut Oil	2,864	4.8	3,897	4.7	36.1	4,354	4.6	11.7	4,705	4.3	8.1
Cottonneseed Oil	2,992	5.0	3,782	4.6	26.4	3,870	4.1	2.3	3,811	3.5	-1.5
Coconut Oil	2,716	4.6	3,387	4.1	24.7	3,446	3.6	1.7	2,499	2.3	-27.5
Olive Oil	1,701	2.9	1,855	2.2	9.1	1,852	2.0	-0.2	2,425	2.2	30.9
Corn Oil	866	1.5	1,477	1.8	70.6	1,854	2.0	25.5	1,989	1.8	7.3
Palm Kernel Oil	571	1.0	1,450	1.7	153.9	1,920	2.0	32.4	2,518	2.3	31.1
Linseed Oil	764	1.3	653	0.8	-14.5	690	0.7	5.7	721	0.7	4.5
Sesame Oil	502	0.8	612	0.7	21.9	728	0.8	19.0	689	0.6	-5.4
Castor Oil	346	0.6	438	0.5	26.6	486	0.5	11.0	433	0.4	-10.9
Vegetable Oils	41,725	69.9	62,694	75.6	50.3	76,282	78.5	21.7	86,995	80.0	14.0
Tallow	6,283	10.5	6,813	8.2	8.4	7460	7.9	9.5	8,133	7.5	9.0
Butter	5,746	9.6	6,500	7.8	13.1	5722	6.0	-12.0	5,819	5.4	1.7
Lard	4,691	7.9	5,509	6.6	17.4	5853	6.2	6.2	6,609	6.1	12.9
Fish Oil	1,214	2.0	1,378	1.7	13.5	1314	1.4	-4.6	1,201	1.1	-8.6
Animal Oils/Fats	17,934	30.1	20,200	24.4	12.6	20,349	21.5	0.7	21,762	20.0	6.9
GRAND TOTAL	59,659	100.0	82,894	100.0	38.9	94,636	100.0	14.2	108,757	100.0	14.9

Sources: Oil World, various issues.